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others. Take your own bottle and you can buy an ounce for fifteen cents, which will last a long time.

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IN tinting, the paint is often mixed with lavender to deepen the tone, instead of mixing it first with the turpentine and then adding the lavender, as is usual in tinting. Deep shades of blue green, capucine red, silver yellow, yellow ochre, etc., can be obtained that are easily put on and are quite as rich as if they had been dusted on. It is much used with matt wax colors, admired in Royal Worcester decorations, as well as with the gouache colors.

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CLOVE OIL should also be bought at the druggist's. It is used exclusively in portrait painting, and can take the place of lavender if the odor is offensive. It works well with the Royal Worcester colors. It does not dry as rapidly as the lavender.

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COPAIBA sometimes takes the place of fat oil. It is also used for tinting where a large surface is to be covered; it keeps the paint open, allowing plenty of time to make the color perfectly even and smooth. One drop is equal to two of lavender or clove oil. Some practical decorators never use anything else. Every china painter should have a bottle of it. Buy five or ten cents' worth at the druggist's. Be sure and have it fresh; when it is old it is thick and stringy and will not work well.

* * *

HARDLY too much can be said in favor of oil of tar. By some it is preferred to all other mediums. After gold has been mixed with fat oil and turpentine, add one or two drops of oil of tar and you will find that it works more freely and does not require such constant turning over with the knife, which is a great help in tracing a delicate pattern. If it grows thick, add a little more turpentine and a drop of the tar as often as required. When one color is used for a border and it is desirable to have it smooth and of equal depth of color, if it is a powder paint mix it first with enough fat oil to moisten it; then add turpentine and tar; if a tube color use only the tar oil and turpentine. A little tar oil can be mixed with paste for raised gold work. Do not be too lavish in its use. Buy this at the druggist's and be sure it is thin—that shows that it is fresh. M. B. ALLING.

Amateur Photography.

TALKS WITH BEGINNERS.

XI.—EMULSION MAKING.

THE ability to make a good emulsion is well worth the trouble taken to gain it. While I cannot claim that no difficulties will be encountered by the beginner in this branch of photographic work, I can promise the careful workman that care, patience and cleanliness will carry him far on the road to success.

The apparatus necessary for the amateur worker are neither numerous nor expensive. A water bath of some sort is the first requisite. A tin pail with a tightly-fitting cover answers very well. Two or three earthenware or porcelain vessels of a pint or more capacity, a thermometer of the pattern used for taking the temperature of hot solutions, a supply of glass stirring rods, a filtering apparatus, and a Bunsen burner, spirit or kerosene lamp, with a flat marble, glass or slate slab for the coating room, constitute all that is absolutely essential in the way of a plant for emulsion making on a small scale. The experimenter will probably introduce improvements and refinements on this rather primitive outfit, as I have done in my own practice, without, however, greatly influencing the character of the results, which depend more on skill and care than on the apparatus used.

As I desire to make my instructions as explicit and thorough as is possible by written words, I shall begin them with the cleaning of the glass, a matter of no slight importance, since chemical or physical dirt on the glasses to be coated will ruin the best emulsion. Most amateurs will have no difficulty in procuring a stock of glass from the limbo to which all poor negatives should be consigned. The first step is to remove the old films. After trying many other methods I have found none so good as a prolonged soaking in a moderately strong solution of hydrochloric acid, using for this purpose an upright tank provided with grooves to hold the plates. Into this tank I drop all my spoiled plates. A few days' immersion will be sufficient to disintegrate the film sufficiently to make its removal under the tap with a Bailey rubber hand-brush an easy task. When the films are removed, the plates are soaked for a short time in diluted ammonia to remove the acid. They are then polished with a little whiting and water, and, when dry, the side to be coated is rubbed with a piece of wash leather damped with alcohol. When all the glasses have been treated in this way, they should be wrapped up in clean paper and stored away until wanted.

The next step is the making of the emulsion. Of the numerous formulas with which I have experimented I shall give only one or two of the best, beginning with one for a slow emulsion well suited to slide or transparency work. In the way of chemicals there will be needed gelatine, hard and soft, nitric acid, bromide of potassium and nitrate of silver. Two solutions are to be made up. For No. 1 take

Gelatine (soft)	80 grains.
" (hard)	40 "
Potassium bromide	70 "
Distilled water	2½ ounces.

The gelatine is cut into small pieces and allowed to soak in the bromized water until soft, when it is dissolved by gentle heat in the water bath, using one of the porcelain vessels. The heat should not exceed 80° and the solution must be stirred occasionally with a glass rod. When the gelatine is dissolved add one drop of nitric acid, and lastly a solution of 90 grains of nitrate of silver dissolved in 2½ ounces of water. This addition must be made in the dark room, and care must be taken to add it to the gelatine solution in a fine stream, constantly stirring the mixture. The emulsion is now formed, but it lacks sensitiveness, which is gained by replacing it in the water bath and keeping it at a temperature of 90° for an hour, carefully protected from white light. At the end of the hour the emulsion is poured out into a clean porcelain tray and allowed to set. As white light would ruin the emulsion it is best to place the tray in a box provided with a tightly-fitting cover and to place the whole in the dark room.

If the temperature be low enough the setting will not be greatly prolonged, but it is as well to make a division of the work here and to defer the breaking up and washing to a second evening.

The effect of the addition of the nitrate of silver is to form the insoluble bromide of silver and the soluble nitrate of potassium, which must be removed before the emulsion is ready for coating.

This is most easily effected by squeezing it through the coarse-meshed canvas which is used for fancy-work. I use a deep earthen vessel, holding a gallon, for washing the emulsion, which is first cut up into small squares with a silver table knife. The washing dish is filled with clean water and covered with the canvas. The emulsion is placed in the centre of the canvas and the four corners of the latter being brought together the emulsion is forced through the meshes by twisting the canvas tightly. After being stirred with a glass rod the emulsion is allowed to settle to the bottom of the dish and as much of the water poured off as possible. The dish is again filled, the emulsion stirred up, allowed to settle and the water poured off again. These operations are repeated eight or ten times, when the emulsion may be considered sufficiently washed, and ready for remelting and filtering preparatory to coating.

The remelting is effected in the water bath at as low a temperature as possible, the emulsion being occasionally stirred with a glass rod. A simple filtering apparatus for small batches of emulsion is made by covering the flanged bottom of a lamp chimney with a piece of wash leather which has been well washed in soda and then in clean water. The emulsion is poured into the top of the chimney and allowed to filter slowly through the leather, the operation being hastened, if necessary, by gently blowing down the chimney.

We are now ready to coat the plates, an operation which requires some little practice before it can be quickly and successfully performed.

The temporary use of a small room will greatly increase the chances of success. This room must be dry, free from dust, well ventilated and capable of being made light tight if the plates are to be dried in it, as is preferable.

For coating some additional apparatus is necessary. The room should be provided with a fairly good-sized table on which is placed the setting slab of marble, slate or glass, and it must be sufficiently large to hold one dozen plates. The slab is accurately levelled by means of small hard wood wedges and a spirit level. Behind the slab and slightly above it, is placed the ruby lamp. The jar into which the emulsion is filtered should have a good lip to facilitate pouring. The plates are slightly warmed and placed in a pile at the right of the operator.

One of the glasses is balanced on the tips of the thumb and fingers of the left hand and a small pool of the emulsion is poured out upon its centre. This should be done carefully to avoid air bubbles. By inclining the plate a trifle, the pool of emulsion is made to flow to the top of the plate, and can then be caused to flow over the entire surface with the help of a glass rod which may be kept in the emulsion jug. The plate is then gently slid on to the slab and allowed to set. In this way one plate after another is coated until the slab is full, when they are removed to drying shelves placed on the walls of the room, or in a properly constructed drying box. The latter I must confess to no great liking for, not having found it as effective as a well-ventilated room. The plates should dry within twenty-four hours, or they will run the risk of proving failures.

Such is in brief outline the method by which I have made many dozens of plates which were at least equal to any of the commercial article, and as I can lay claim to no special skill as a manipulator, I believe it to be a practical method for any amateur who desires to learn and practice photography from the foundation.

This formula gives rich black tones, eminently adapted to slides and bromide paper. Warmer tones will be more easily obtained by substituting 12½ grains of iodide of potassium for 10 grains of the bromide of the formula. This addition will give the brown tones which are preferred by many.

This emulsion is rather slow for landscape work, although on account of its brilliant and clean working qualities I prefer it to more rapid plates where speed is not an indispensable requisite. Its rapidity may be increased by allowing it to ripen for some days in a cool, dry place before washing. W. H. BURBANK.

A GOOD toning bath for aristo paper is one containing platinum instead of gold, according to the following formula:

No. 1.—	Oxalate of potassium	3 ounces.
	Phosphate of potassium	1½ "
	Water	34 "
No. 2.—	Platino-chloride of potassium	15 grains.
	Water	5 drams.

Take six parts of No. 1 and one part of No. 2. The prints must be well washed before toning.

NEGATIVES of uneven density may be printed evenly by placing the printing-frame in a slanting position in a box, with the thin part of the negative at the bottom. The printing must be done in diffused light.